

**METHOD FOR DETECTING OVERLAP OF SCHEDULED RECORDING TIMES**

**BACKGROUND OF THE INVENTION**

5 **Field of the Invention**

[0001] The present invention relates to a schedule recording apparatus, and more particularly, to a method for detecting overlap of scheduled recording times.

10 **Description of the Related Art**

[0002] Digital broadcast is a common name of all the broadcasts that are digitally transmitted. Generally, a stream transmitted as a digital broadcast can carry data information as well as a video/audio signal.

15 [0003] The data broadcast for the data information allows an audience to obtain additional information on a broadcasting program, purchase goods, search for interesting information on weather, share, news, etc., and use a banking service by simple manipulation at home during his or her watching a television set.  
20 In addition, the audience can make an active participation in a broadcasting program. For example, the audience can participate in a live quiz show program to win a prize according to his or her obtained points, give an account for news, or reflect his or her opinion to a broadcasting program.

[0004] Accordingly, the digital broadcast can provide various data information besides video and audio provided by the conventional analogue broadcast.

5 [0005] The digital broadcast can provides the above-mentioned various services by transmitting various additional information through a broadcasting program and system information protocol (PSIP) in contrast to the conventional analogue broadcast.

[0006] This PSIP information includes a system time table (STT) containing base time (BT). Accordingly, when a user  
10 commands a recorder to reserve and record a broadcasting program, the recorder sets a schedule recording time including a record start time and a record end time of the broadcasting program with reference to base time of a channel that will provide the broadcasting program.

15 [0007] Meanwhile, there exists a small difference in base time between the channels of broadcast stations that provide a plurality of broadcast programs because of technical reasons of each broadcast station. For example, even if all the base times are set to be 10 o'clock, the base times of first, second, and  
20 third channels may be 10:00, 10:03 and 10:10 respectively because of the technical reasons of each broadcast station.

[0008] In this case, when the user intends to reserve and record broadcasting programs transmitted from the different channels, the scheduled recording times for some of the  
25 broadcasting programs may be overlapped with each other. Here, a

broadcasting program of a channel cannot be reserved and recorded, the scheduled recording time of which is between the record start time and the record end time of a broadcasting program of another channel.

5     **[0009]** Of course, a broadcasting program of a channel can be scheduled-recorded, the scheduled recording time of which does not overlap with the scheduled recording time of a broadcasting program of another channel.

10     **[0010]** For example, however, assuming that a first broadcasting program of a first channel, which starts at 8:30 (record start time) and ends at 10:00 (record end time), is scheduled-recorded (i.e. first scheduled recording time) while a second broadcasting program of a second channel, which starts at 10:00 (record start time) and ends at 11:00 (record end time), is  
15     scheduled-recorded (i.e. second scheduled recording time).

**[0011]** Here, the first and second scheduled recording times are set based on the base times of the corresponding channels.

**[0012]** Accordingly, if the base times of the corresponding channels are a little different from each other, the first  
20     scheduled recording time of the first channel and the second scheduled recording time of the second channel may overlap. In other words, actually, the first broadcasting program of the first channel may start at 8:40 and end at 10:10 while the second broadcasting program of the second channel starts at 10:00 and  
25     ends at 11:00. Therefore, the first and second broadcasting

programs overlap from 10:00 to 10:10 so that none of broadcasting programs cannot be reserved and recorded during the period from 10:00 to 10:10.

5

#### **SUMMARY OF THE INVENTION**

[0013] Accordingly, the present invention is directed to a method for detecting an overlap of scheduled recording times, which substantially obviates one or more problems due to limitations and disadvantages of the related art.

10 [0014] An object of the present invention is to provide a method for detecting an overlap of the scheduled recording times of broadcasting programs caused by a difference between base times of the corresponding channels.

[0015] Additional advantages, objects, and features of the  
15 invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the  
20 structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0016] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a method for detecting an overlap of  
25 scheduled recording times includes the steps of: (a) ascertaining

whether there exists any broadcasting program reserved to record;  
(b) if there exists any broadcasting program scheduled to record,  
correcting a scheduled recording time of the broadcasting program  
scheduled to record on the basis of calculated time correction  
5 data for channels; (c) determining whether or not the scheduled  
recording times of the broadcasting programs overlap; and (d) if  
the scheduled recording times of the broadcasting programs  
overlap, reporting information on the overlap.

[0017] The method for detecting an overlap of scheduled  
10 recording times may further include the step of: (e) before the  
step (a), when a power is turned on, calculating the time  
correction data for the channels.

[0018] The step (e) may include the steps of: setting, as a  
reference time, a base time provided from a reference channel  
15 tuned first when the power is turned on; obtaining base times  
provided from remaining channels excepting for the reference  
channel; and calculating the time correction data for the  
channels by using the reference time and the base times.

[0019] It is desirable that the calculated time correction  
20 data are time differences between the reference time and the base  
times of the remaining channels.

[0020] The step (b) may includes the steps of: reading the  
time correction data of the channels corresponding to the  
broadcasting programs reserved to record among the calculated  
25 time correction data of the channels; and adding the read time

correction data to the scheduled recording times of the broadcasting programs scheduled to record.

[0021] In another aspect of the present invention, a method for detecting an overlap of scheduled recording times includes the steps of: (a) when a power is turned on, calculating time correction data for channels; (b) if there exists any broadcasting program reserved to record, correcting a scheduled recording time of the broadcasting program reserved to record on the basis of calculated time correction data for the channels; (c) determining whether the corrected scheduled recording times of the broadcasting programs overlap; and (d) if the scheduled recording times of the broadcasting programs overlap, reporting information on the overlap.

[0022] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0023] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0024] FIG. 1 is a flowchart of a method for detecting an overlap of scheduled recording times according to a preferred embodiment of the present invention;

[0025] FIG. 2 is a flowchart of a method for calculating time correction data shown in FIG. 1; and

[0026] FIG. 3 illustrates that broadcasting programs reserved to record by the method for detecting an overlap of scheduled recording times according to a preferred embodiment of the present invention overlap.

10

#### DETAILED DESCRIPTION OF THE INVENTION

[0027] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0028] FIG. 1 is a flowchart of a method for detecting an overlap of scheduled recording times according to a preferred embodiment of the present invention.

20 [0029] Referring to FIG. 1, in a method for detecting an overlap of scheduled recording times according to a preferred embodiment of the present invention, when a schedule recording key signal is inputted to record a broadcasting program (S101), it is ascertained whether there exists any broadcasting program  
25 scheduled to record (hereinafter, referred to as 'scheduled

recording broadcasting program) (S102). Here, the schedule recording key signal is a signal used to detect the overlap of the scheduled recording times of the scheduled recording broadcasting programs. Accordingly, it is supposed that at least one broadcasting program provided at least one channel was reserved to record.

[0030] If there no exists a scheduled recording broadcasting program, a user can reserve his or her wished broadcasting programs for recording by additional key manipulation.

10 [0031] If there exists any scheduled recording broadcasting program, it is ascertained whether there exists any scheduled recording broadcasting program of a channel that is different from the channel the broadcasting program of which the user is watching (hereinafter, referred to as current watching channel) (S103).

15 [0032] Here, if there no exists a scheduled recording broadcasting program of a channel that is different from the current watching channel, the user can reserve and record his or her wished broadcasting programs by additional key manipulation.

20 [0033] If there exists any scheduled recording broadcasting program of a channel that is different from the current watching channel, the time correction data of the channels corresponding to the scheduled recording broadcasting programs are read among the calculated time correction data of each channel stored in a channel map (S104).. Here, the time correction data were

25



calculated for each channel and stored beforehand. The method of calculating the time correction data will be described in detail later.

[0034] A scheduled recording time of the scheduled recording  
5 broadcasting program is corrected on the basis of the time correction data for channels (S105).

[0035] In other words, as described above, since the time correction data are calculated for each channel, the scheduled recording times of the scheduled recording broadcasting programs  
10 are corrected on the basis of the time correction data for channels corresponding to the scheduled recording broadcasting programs.

[0036] For example, the first time correction data of the first channel can be added to the scheduled recording time, that  
15 is, the record start time and the record end time of the first scheduled recording broadcasting program. The second time correction data of the second channel can be added to the scheduled recording time of the second scheduled recording broadcasting program. The third time correction data of the  
20 third channel can be added to the scheduled recording time of the third scheduled recording broadcasting program.

[0037] The above-mentioned adding correction method is merely an example and various modifications can be made, for example, any one selected from four arithmetic operations such as addition,  
25 subtraction, multiplication and division.

[0038] It is determined whether the corrected scheduled recording times of the scheduled recording broadcasting programs overlap (S106).

[0039] Here, it is desirable that the determination of the overlap is performed using the corrected scheduled recording times.

[0040] In other words, by comparing the scheduled recording time (record start time and record end time) of the first scheduled recording broadcasting program with the scheduled recording time (record start time and record end time) of the second scheduled recording broadcasting program, it can be determined whether the scheduled recording time of the first scheduled recording broadcasting program is overlapped with the scheduled recording time of the second scheduled recording broadcasting program. Of course, by using the scheduled recording times of other scheduled recording broadcasting programs, it can be ascertained whether the scheduled recording times of other scheduled recording broadcasting programs overlap.

[0041] Accordingly, through the above-mentioned process, the overlap of the scheduled recording broadcasting programs can be detected in advance.

[0042] If the scheduled recording times of the scheduled recording broadcasting programs overlap, information on the overlap is reported to a user in the form of message or voice (S107).

[0043] As described above, in the present invention, since scheduled recording time of each scheduled recording broadcasting program is corrected using calculated time correction data, the overlap of the scheduled recording broadcasting programs caused  
5 by a small difference between the base times of channels can be detected.

[0044] The method for calculating the time correction data read at the step S104 will be described.

[0045] FIG. 2 is a flowchart of a method for calculating time  
10 correction data shown in FIG. 1.

[0046] Referring to FIG. 2, in the method for calculating the time correction data according to the present invention, an apparatus such as a scheduled recording apparatus (a recorder to reserve and record a broadcasting program) or a television set is  
15 turned on (S201).

[0047] When the apparatus is turned on, a reference channel set in default by a user is tuned (S202).

[0048] Here, system time table provided through the reference channel is received from a corresponding broadcast station (S203).

20 [0049] The base time of the reference channel is extracted from the received system time table (S204).

[0050] The extracted base time is set to be a reference time used to synchronize base times of other channels (S205). The set reference time is stored in a channel map (S206).

[0051] Accordingly, the channel tuned first when the power is turned on is preferably set to be a reference channel having a reference time. In the present invention, the channel set in default is set to be a reference channel but the reference  
5 channel can be set variously.

[0052] Meanwhile, if the base time of the reference channel is set to be a reference time and stored in the channel map, it is ascertained whether the remaining channels excepting for the reference channel are tuned (S207).

10 [0053] Generally, when the corresponding apparatus is turned on, since the remaining channels as well as the reference channel set in default are tuned, the step S207 can be omitted.

[0054] As the result of the ascertainment, if the remaining channels are tuned, the system time tables of the remaining  
15 channels are received from the broadcast stations corresponding to the remaining channels (S208).

[0055] The base times are extracted from the system time tables of the remaining channels and the extracted base times are stored in the channel map (S209).

20 [0056] Accordingly, the channel map contains the reference time of the reference channel and the base times of the remaining channels.

[0057] Here, the time correction data for the channels are calculated using the reference time for the reference channel and

the base times for the remaining channels that are stored in the channel map (S210).

[0058] The time correction data can be calculated using any one of four arithmetic operations such as addition, subtraction, multiplication and division. In the present invention, the result values (i.e. time difference) obtained by subtracting the base times of the remaining channels from the reference time of the reference channel are used as the time correction data for each channel.

[0059] The method of calculating the time correction data will be described in detail.

[0060] For example, supposing that the base time of the first tuned channel, that is, the reference time of the reference channel is T1 and then the base times of the next sequentially tuned channels are T2, T3, T4, ..., and TN respectively, the reference time T1 of the reference channel and the base times T2, T3, T4, ..., and TN of the remaining channels are defined as follows:

[0061] T1 = the base time of the first tuned channel;

[0062] T2 = the base time of the second tuned channel;

[0063] T3 = the base time of the third tuned channel;

[0064] ...; and

[0065] TN = the base time of the N-th tuned channel.

[0066] When the reference time T1 of the reference channel and the base times T2, T3, T4, ..., and TN of the remaining

channels are applied to the subtraction method, the correction time data  $G_1, G_2, \dots$ , and  $G_N$  for the channels are calculated as follows:

[0067]  $G_1 = 0;$

5 [0068]  $G_2 = T_1 + G_1 - T_2 = T_1 - T_2;$

[0069]  $G_3 = T_2 + G_2 - T_3 = T_2 + (T_1 - T_2) - T_3 = T_1 - T_3;$

[0070]  $\dots$ ; and

[0071]  $G_N = T_{N-1} + G_{N-1} - T_N = T_1 - T_N,$

[0072] where  $G$  is time difference between the base time of  
10 the reference channel and the base time of the corresponding channel.

[0073] Accordingly, even though the base time  $T_1$  of the reference channel is not stored separately, if the base time  $T$  of a previous channel and the time difference  $G$  are known, the time  
15 difference between  $T_1$  and the base time of each channel can always be calculated.

[0074] Therefore, summarizing the above-mentioned, the following equation can be made.

[0075]  $T_N$  = the base time  $BT$  extracted from the system time  
20 table  $STT$  of the  $N$ -th tuned channel.

[0076]  $G_N$  = the base time  $T_{N-1}$  of the  $N-1$ -th tuned channel + the time difference  $G_{N-1}$  of the  $N-1$ -th tuned channel - the base time  $T_N$  of the  $N$ -th tuned channel.

[0077] The calculated time correction data for channels are mapped to the corresponding channels in one-to-one mapping and stored in the channel map (S211).

5 [0078] Accordingly, the scheduled recording times of the scheduled recording broadcasting programs are corrected using time correction data of each channel stored in the channel map so that it is easy to detect the overlap of the scheduled recording broadcasting programs.

[0079] FIG. 3 illustrates that broadcasting programs reserved  
10 to record by the method for detecting an overlap of scheduled recording times according to a preferred embodiment of the present invention overlap.

[0080] Referring to FIG. 3, a broadcasting program  $P_i$  of an  $i$ -th tuned channel and a broadcasting program  $P_k$  of a  $k$ -th tuned  
15 channel are reserved to record respectively. Here, suppose that the broadcasting program  $P_i$  has a scheduled recording time consisting of a record start time  $S_i$  of 10 o'clock and a record end time  $E_i$  of 11 o'clock and the broadcasting program  $P_k$  has a scheduled recording time consisting of a record start time  $S_k$  of  
20 11 o'clock and a record end time  $E_k$  of 12 o'clock. Here, it is assumed that the time correction data of the broadcasting program  $P_i$  and the broadcasting program  $P_k$  are  $G_i = 10$  and  $G_k = 0$  respectively. Here, the time correction data are obtained by synchronizing the base times of the  $i$ -th and  $k$ -th tuned channels  
25 with the reference time of the reference channel respectively.

[0081] Accordingly, the broadcasting program  $P_i$  should be recorded from 10 o'clock to 11 o'clock and the broadcasting program  $P_k$  should be recorded from 11 o'clock to 12 o'clock.

[0082] However, since the base times of the  $i$ -th and  $k$ -th  
5 tuned channels are a little different from each other, the time correction data are  $G_i = 10$  and  $G_k = 0$  as assumed above.

[0083] Accordingly, the time correction data are added to the scheduled recording times of the broadcasting programs  $P_i$  and  $P_k$  respectively so that the scheduled recording times of the  
10 broadcasting programs  $P_i$  and  $P_k$  are corrected respectively as follows.

[0084] The scheduled recording time of the broadcasting program  $P_i$  is corrected to have the record start time  $S_i'$  of 10:10 and the record end time  $E_i'$  of 11:10, and the scheduled  
15 recording time of the broadcasting program  $P_k$  is corrected to have the record start time  $S_k'$  of 11:00 and the record end  $E_k'$  time of 12:00.

[0085] As described above, scheduled recording times of the scheduled recording broadcasting programs are corrected using  
20 time correction data for each channel calculated with reference to a reference time of a reference channel, whereby the overlap of the scheduled recording broadcasting programs caused by the small difference between base times of the channels can be detected.



[0086] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they  
5 come within the scope of the appended claims and their equivalents.